FILLER NECK FOR MOTOR VEHICLE FUEL TANK

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field:

[0002] The invention relates to a fuel tank filler neck and more particularly to a filler neck for a between the rail (BTR) fuel tank which fits between a vehicle body floor and the vehicle chassis while admitting a high fuel flow rate on filling of the BTR fuel tank.

[0003] 2. Description of the Problem:

[0004] Filler necks connecting a fuel inlet on the side of a vehicle and a BTR fuel tank commonly found on busses have been unduly restrictive of fuel flow in certain applications. Fuel flow restriction has occurred due to the increasingly horizontal slope of the filler neck and the restricted diameter of the circular pipes sized to fit between the bus floor and the vehicle's frame rails. This has resulted in the back up of fuel as the fuel moves toward the fuel tank on filling.

SUMMARY OF THE INVENTION

[0005] According to the invention there is provided a fuel tank assembly for a motor vehicle. The vehicle is conventionally a school bus having a body, a body floor and a pair of parallel chassis frame rails which support the body. The fuel tank assembly comprises a fuel tank supported between the frame rails under the body floor. Fuel is added to the fuel tank through a filler neck having an inlet on a side of the motor vehicle. The filler neck connects the inlet to the fuel tank. The filler neck passes between the floor of the body and one of the frame rails. In order to assure a high rate of fuel flow the filler neck increases in cross sectional area as it comes closer to the fuel tank and the slope of the neck becomes more horizontal. The cross sectional profile of the neck varies from the inlet to the fuel tank between the vehicle floor body and the frame rails to allow a first increase in sectional area while still fitting between floor and frame rail. The filler neck has a circular cross

sectional profile adjacent the inlet, flattens to an oblong cross sectional shape where the neck passes over one of the frame rails and returns to a circular cross sectional shape, of increased diameter, proximate to the fuel tank inlet.

[0006] Additional effects, features and advantages will be apparent in the written description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

[0008] **Fig. 1** is a perspective view of a bus.

[0009] **Fig. 2** is a top plan view of a bus chassis incorporating a between the rails fuel tank and its filler neck.

[0010] **Figs. 3A** and **3B** are perspective view of a fuel tank assembly in accord with the present invention.

[0011] **Fig. 4** is a front section of the fuel tank assembly.

[0012] **Fig. 5** is a top plan of a portion of the filler neck of the fuel tank assembly of **Fig. 4**.

[0013] **Fig. 6** is a cross sectional view taken along section line **6--6** of **Fig. 4**.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring now to the figures and in particular to **Fig. 1**, a school bus **10**, which incorporates a fuel system in accordance with the present invention, is illustrated. Along one side of school bus **10**, here driver's side **12**, a fuel inlet cover **14** is visible. Although fuel inlet cover **14** is illustrated as installed on the driver's side **12** of the vehicle, it is often located on the vehicle's opposite side. Fuel inlet cover **12** may be moved to allow access to a filler neck inlet behind the cover, by which fuel is added to a between the rails (BTR) fuel tank located under the bus body and between the front **86** and rear wheels **90**.

[0015] The location of a fuel tank system **20** is best illustrated with reference to **Fig. 2** which shows fuel tank system **20** as positioned on a vehicle chassis **80**. Vehicle chassis **80** is based on two longitudinally aligned, mutually parallel frame rails **81**, **82**. Frame rails **81**, **82** are held in parallel, and chassis **80** stiffened, by a plurality of cross members **83** which are located at mutually spaced locations running from the front to the back of the vehicle. Fuel tank system **20** comprises a fuel tank **26** held in a cradle **22** which is suspended from the outside faces of frame rails **81**, **82**. Fuel tank **24** is located about midway between the front and the back of chassis **80** and between frame rails **81** and **82**. Fuel is added to fuel tank **24** through a filler neck **26** which is disposed between the top of the fuel tank running to the side of the chassis **80** over right hand side frame rail **82**.

[0016] Referring now to **Figs. 3A** and **3B**, the manner of supporting fuel tank **24** using cradle **22** and the routing of filler neck **24** from a side of the vehicle body to the fuel tank is more completely illustrated. In **Fig. 3B** all features other than filler neck **26** and a protective shield **46** are shown in phantom to allow complete illustration of the filler neck. Cradle **22** comprises a plurality of slats **30** which run from side to side of the chassis **80**, under frame rails **81**, **82** and which support fuel tank **24** from underneath the fuel tank between the frame rails and which position the fuel tank at least partly at the level of the frame rails. The details of construction of cradle **22** are not important to understanding the invention and are in any event conventional. At least a pair of braces **34** depend from each of the outside faces of frame rails **81**, **82**, extending below the frame rails and carrying longitudinal supports **32** which are parallel to and below their respective frame rails. Slats **30** are

connected between longitudinal supports **32**. The bottom surface of fuel tank **24** may be indented to conform to the shape of slats **30**. At least a pair of steal bands **36** are mounted around fuel tank **24**, connecting at opposite ends to one of slats **30** using an appropriate, adjustable connector **38**.

[0017] Filler neck **26** extends from an inlet **49** accessible from port **40** in body sidewall **17** to the upper exterior surface of fuel tank **24**, passing over frame rail **82**. Port **40** is located in sidewall **17** just above the level of floor **28**. A housing **42** (with roof removed to allow viewing of the filler neck) protecting filler neck **26** is constructed around the portion of the filler neck which extends above the level of the floor. Filler neck **26** is slanted to pass though an opening **44** in floor **28** thus passing below the level the floor outside of frame rail **82**. The downward slant promotes the flow of fuel toward fuel tank **24**. Filler neck **26** passes between floor **28** and the upper surface of frame rail **82** between its inlet and its point of connection to fuel tank **24**. Filler neck **26** is protected outside of frame rail **82** by a protective cover or shield is constructed of a half cylinder **46** which is placed below floor **28** under filler neck **26**.

[0018] Referring to **Fig. 4**, the changes in slope of filler neck **26** moving from inlet section **50** adjacent the outside wall of the bus toward tank **24** are better illustrated. Filler neck **26** comprises three sections of distinct shapes and sizes. The sections are an inlet section **50** closest to the side wall of the bus, which is downwardly sloped, a mid-section **51** which lies essentially horizontally and which passes over frame rail **82** but under floor **28**, and an outlet section **52** which connects to fuel tank **26** through an outlet **53**. Referring briefly to **Fig. 6** it may be seen the mid-section **51** fits between the bottom of floor **28**, the top of frame rail **82** and between a pair of cross supports **60**, on which floor **28** rest and which are supported from the frame rails. Mid-section **51**, unlike inlet section **50** and outlet section **52** which have circular cross sectional shapes, has an oblong cross-sectional shape, being flattened from top to bottom.

[0019] Referring to **Fig. 5**, a portion of filler neck **26** is isolated to emphasize the oblong character of mid-section **51**. Inlet section **50** and outlet section **52** both have circular cross-sections, however, the diameters A and B of these sections differ, with diameter B being greater than diameter A to assure that the outlet section does not become a choke point for fuel flow.

[0020] The invention provides a fuel tank filler neck for BTR fuel tanks commonly found on busses which is not unduly restrictive of fuel flow at some point along the neck. Fuel flow restriction resulting from horizontally sloped sections of the filler neck is compensated for by increasing the cross sectional area of the neck. The restricted diameter the conventionally circular pipes used between the vehicle floor and vehicle side rails has been negated by using a pipe having a section in the effected area that is other than round.

[0021] While the invention is shown in only one of its forms, it is not thus limited but is susceptible to various changes and modifications without departing from the spirit and scope of the invention.